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David Wilson

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EXAMINER

MCGUTHRY BANKS, TIMA MICHELE

ART UNIT

PAPER NUMBER

1793

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DELIVERY MODE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/531,649	Applicant(s) WILSON ET AL.	
	Examiner TIMA M. MCGUTHRY-BANKS	Art Unit 1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 August 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4,6-8,10-20 and 22-33 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4,6-8,10-20 and 22-31 is/are rejected.
- 7) ☒ Claim(s) 32 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This supplemental action is to substitute the office action dated 11/12/2008.

Status of Claims

Claims 1, 2, 6-8, 17-19, 22-26 and 32 are currently amended, Claims 3, 4, 10-16, 20 and 27-31 are as previously presented, Claims 5, 9 and 21 are cancelled, and Claim 33 is new.

Drawings

The drawings were received on 14 August 2008. These drawings are accepted.

Claim Rejections - 35 USC § 102

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 17-20 and 27 are rejected under 35 U.S.C. 102(b) as being anticipated by Stift.

Stift anticipates the claimed invention. Stift teaches a muffle shaft furnace. The first furnace chamber is read by 4, a first arrangement is read by 10-12, and a second arrangement is read by 13 and 14. The second furnace chamber is read by 5, the heating arrangement is taught by fuel gas conduits 19 and 20, and the third arrangement is read by 16-18 (column 5, lines 35-60). Regarding the limitation of reducing predetermined amounts of iron oxides and lead oxides to iron and lead, respectively, language in the claim that suggests or makes optional but does not require steps to be performed or does not limit a claim to a particular structure does not limit the

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scope of a claim or claim limitation, for example statements of intended use or field of use. See MPEP § 2106.

Regarding Claim 18, to avoid condensation of zinc within the withdrawal conduits as well as within the downwardly moving furnace charge, the temperature prevailing there shall be higher than the evaporating temperature of the zinc. The zinc-containing gases are sucked off from below the depth of plane 28 (shown in FIGs 2 and 3) (column 7, lines 9-22). Regarding Claim 19, the arrangement is read by 11 and 12. Regarding Claim 20, this limitation is read by outlets 10. Regarding Claim 27, this limitation is read by 13 and 14.

Claims 17-19, 22-27 are rejected under 35 U.S.C. 102(b) as being anticipated by Bailly (US 1,704,029).

Bailly anticipates the claimed invention. As shown in Figures 1 and 2, the first chamber is represented by 2, the first arrangement is represented by 35, the second arrangement is represented by 36, the second furnace chamber is represented by 4, the heating arrangement is taught by the fact that chamber 4 is a melting chamber, and the third arrangement is taught by pouring spout 13. While features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function. A claim containing a “recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus” if the prior art apparatus teaches all the structural limitations of the claim. See MPEP § 2114. Regarding Claims 18 and 19, the fourth arrangement is taught by 23, 24 and 37. Regarding Claim 22, remaining combustible gas is carried to the combustion chamber (page 1, lines 102-109). Regarding Claim 23, the fifth

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arrangement is taught by 13. Regarding Claim 24, the addition of another tap is mere duplication of parts and has no patentable significance unless a new and unexpected result is produced. See MPEP § 2114.04. Regarding Claim 25, it is inherent that the reduced material is fed to the second furnace chamber by gravity. Regarding Claim 26, the melting chamber is heated by means of an annular carbon resistor 7 that may be removable and is external to the furnace chamber. Regarding Claim 27, the cooling zone is taught by 36.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 1-4, 6-8, 10, 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishikawa et al (US 5,843,204) in view of Matsuoka et al (US 5,139,567).

Ishikawa et al teaches a method for recycling iron and steel industry waste. Iron and steel sludge is mixed with an external reductant. The mixture is dehydrated to form a dehydrated cake (column 6, lines 23-46). Reduction of metal oxides such as iron oxide, zinc oxide and lead oxide is performed. Zinc metal is evaporated. Since the applicant defines the boiling point of lead is 1515 C on page 6, it is inherent that lead does not evaporate since Ishikawa et al teaches a reduction temperature is between 1000-1200 C (column 7, lines 15-21). The remaining metals are melted (lines 38-57). Regarding Claim 6, heat energy of the discharge gas is recovered in a boiler at a succeeding state by the use of vapor (column 6, lines 7-10). Regarding Claim 7, a slag material is added (column 6, lines 37 and 38). Regarding Claim 8, the gas-solid reaction section is separated from the basin, where the molten product is held by an intermediate section (column

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9, lines 31-43). Regarding Claim 10, the waste includes steel dust, which reads on EAF as defined by applicant on page 4, lines 4 and 5. Regarding Claim 15, the carbonaceous material is discussed above as the reductant. Regarding Claim 16, step (a) is in the rotary kiln. However, Ishikawa et al does not teach separately recovering molten iron and molten lead as in Claim 1 or controlling the zinc vapor as in Claims 2-4.

Regarding Claim 1, Matsuoka et al teaches recovering valuable metals from a dust such as EAF dust (column 1, lines 6-9) by mixing the dust with a reductant, pelletizing the mixture, selectively reducing iron oxide while suppressing reduction of zinc oxide and charging the pellets to a smelting furnace where zinc is evaporated and iron and lead are molten and separated by density (abstract). It would have been obvious to one of ordinary skill in the art at the time the invention was made to expect that lead and iron in Ishikawa et al would be further recovered separately as taught by Matsuoka et al, since iron and lead are well known in the art of metallurgy to have separate applications.

Regarding Claim 2, it would have been obvious to one of ordinary skill in the art at the time the invention was made to control the zinc vapor in Ishikawa et al to prevent or minimize premature recondensation, since Ishikawa et al teaches the desire to remove zinc because of the adverse effects on blast furnace operations (column 1, lines 38-40). Regarding Claims 3 and 4, these limitations are taught in Figure 1.

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ishikawa et al in view of Matsuoka et al as applied to claim 1 above, and further in view of Wetzel (US 3,647,417) or Wildman (US 2,014,873).

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Ishikawa et al in view of Matsuoka et al discloses the invention substantially as claimed. However, Ishikawa et al in view of Matsuoka et al does not disclose using brown coal or peat as claimed. Wetzel et al teaches producing sponge iron using iron ore (column 1, lines 5 and 6), including materials such as the iron oxides resulting from cutting of steels, etc (column 2, lines 11 and 12). It is preferred to use brown coal or similar solid fuels (lines 42 and 43). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use brown coal in the process of Ishikawa et al in view of Matsuoka et al, since Wetzel et al teaches that these fuels have excessive amounts of volatile components (line 43). Alternatively, Wildman teaches producing sponge iron for conversion into pig iron or steel (page 1, lines 1 and 2). Iron oxides are reduced in the presence of peat humus (lines 16 and 17). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use peat in the sponge iron of Ishikawa et al in view of Matsuoka et al, since Wildman teaches that carbon derived from peat during the reduction process dissolves in iron only at temperatures above the melting point of the iron only at temperatures above the melting point of the iron. Since the reduction temperature is kept below this point, the sponge iron produced is substantially free of dissolved or included carbon (lines 20-27).

Claims 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishikawa et al in view of Matsuoka et al as applied to claim 1 above, and further in view of Yasukawa et al (US 4,525,208).

Ishikawa et al in view of Matsuoka et al discloses the invention substantially as claimed. However, Ishikawa et al in view of Matsuoka et al does not disclose forming a cohesive mass as in Claim 12 or a pellet as in Claim 13. Yasukawa et al teaches a method of recovering Zn and Pb

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form iron and steel dust using a rotary kiln (abstract). The iron and steel dust may be in the form of a powder or it may be pelletized in advance and then fed in the form of pellets (column 3, lines 19-21). It would have been obvious to one of ordinary skill in the art at the time the invention was made to form a cohesive mass or a pellet in Ishikawa et al in view of Matsuoka et al, since Yasukawa et al teaches that when the iron and steel dust is pelletized, the pellets incorporate the whole or part of the reducing agent and promote the reaction of reduction advantageously (column 3, lines 21-24).

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ishikawa et al in view of Matsuoka et al and Yasukawa et al as applied to claims 1 and 13 above, and further in view of Freeman.

Ishikawa et al in view of Matsuoka et al and Yasukawa et al discloses the invention substantially as claimed. However, Ishikawa et al in view of Matsuoka et al and Yasukawa et al does not disclose forming the pellet by extrusion as claimed. Freeman teaches preparing sponge metal pellets. Ground iron oxide and binder are mixed and then shaped or extruded, preferably in standard extrusion equipment. The extrusions are then sent to a pelletizer (column 3, lines 47-59). It would have been obvious to one of ordinary skill in the art at the time the invention was made that the pellets in Ishikawa et al in view of Matsuoka et al and Yasukawa et al could be formed by extrusion, since Freeman teaches the use of an extruder to produce sponge iron pellets, and these pellets are sufficiently hard to resist attrition in subsequent reducing and handling operations (column 4, lines 9-11).

Claims 21-25 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stiff as applied to claim 17 above, and further in view of Stockinger et al.

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Stift discloses the invention substantially as claimed. Stift discloses a second furnace chamber 5, but does not disclose a heating arrangement and a fourth arrangement as in Claims 21, and 23-25. Stockinger et al teaches a shaft furnace above a melter gasifier as shown below in Figure 1. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the muffle shaft furnace of Stift with the melter gasifier of Stockinger et al, since Stift teaches eventually producing pig iron from sponge (column 1, line 27), and Stockinger et al also teaches producing pig iron from sponge (abstract). The combination of the muffle shaft furnace of Stift and the melter gasifier of Stockinger et al would also yielded the predictable result of producing pig iron. Regarding Claim 23, Stockinger et al teaches a tap 12 (column 4, line 4). Regarding Claim 24, the addition of another tap is mere duplication of parts has no patentable significance unless a new and unexpected result is produced. See MPEP § 2144.04. Regarding Claim 25, the shaft furnace is above the melter gasifier.

Regarding Claim 22, Stift teaches that natural gas, methane and/or flue gas can be used as the fuel gas for conduits 19 and 20 (column 3, lines 62 and 63), but does not teach that the flue gas comes from further heating as claimed. Stockinger et al teaches recirculating reducing gas via line 4 to the shaft furnace (column 4, lines 26 and 27). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the recirculating reducing gas taught by Stockinger et al in the process of Stift, since Stift teaches using flue gas, and Stockinger et al exemplifies that it is well known to recycle the exit reducing gas stream to produce sponge iron.

Regarding Claim 27, Stift teaches a gas purifying and cooling means 13 (column 5, lines 46-49).

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Claims 21 and 23-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stift as applied to claim 17 above, and further in view of Gordon et al (US 6,875,251 B2).

Stift discloses the invention substantially as claimed. Stift discloses a second furnace chamber 5, but does not disclose a heating arrangement and a fourth arrangement as in Claims 21 and 23-26. Gordon et al teaches a process for the manufacture of steel wherein the direct reduction furnace is "stacked" above the electric arc furnace so that the DRI can be fed to the electric arc furnace by gravity (abstract). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the muffle shaft furnace of Stift with the electric arc furnace of Gordon et al, since Stift teaches eventually producing pig iron from sponge (column 1, line 27), and Gordon et al also teaches producing pig iron from sponge (abstract). The combination of the muffle shaft furnace of Stift and the electric arc furnace of Gordon et al would also yielded the predictable result of producing pig iron. Regarding Claim 23, Gordon et al teaches steel and slag tapping in Figure 1. Regarding Claim 24, the addition of another tap is mere duplication of parts has no patentable significance unless a new and unexpected result is produced. See MPEP § 2144.04. Regarding Claim 25, the DRI is fed by gravity. Regarding Claim 26, the transformers for the electrodes are in outside of the furnace (column 4, lines 11-13).

Regarding Claim 27, Stift teaches a gas purifying and cooling means 13 (column 5, lines 46-49).

Claims 28-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stift in view of Stockinger et al or Gordon et al as applied to claims 17 and 27 above, and further in view of Cattelain (US 3,592,631).

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Stift in view of Stockinger et al or Gordon et al disclose the invention substantially as claimed. However, Stift in view of Stockinger et al or Gordon et al do not disclose a splash condenser as in Claims 28-31. Cattelain teaches a dry crossover duct system comprising gas scrubbing tower as shown below in Figures 1 and 2.

The zinc exit gas is conveyed from a condenser to a scrubbing tower (column 2, lines 11-12). Regarding Claim 29, the main condenser chamber configuration is taught in Figure 1. Regarding Claim 30, 2 and 3 teach the claimed embodiment. Regarding Claim 21, the conduit is taught by 2 and 3 and is substantially lateral. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a the system of Cattelain in the apparatus of Stift in view of Stockinger et al or Gordon et al, since Cattelain teaches that there is no impingement by hot dirty gases on any surfaces in the wet/dry transition zone to cause accretion (column 3, lines 16-18).

Claims 28-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bailly as applied to claim 17 above, and further in view of Cattelain.

Bailly discloses the invention substantially as claimed. However, Bailly does not disclose a splash condenser as in Claims 28-31. Cattelain teaches a dry crossover duct system comprising gas scrubbing tower as in Figures 1 and 2.

The zinc exit gas is conveyed from a condenser to a scrubbing tower (column 2, lines 11-12). Regarding Claim 29, the main condenser chamber configuration is taught in Figure 1. Regarding Claim 30, 2 and 3 teach the claimed embodiment. Regarding Claim 31, the conduit is taught by 2 and 3 and is substantially lateral. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a the system of Cattelain in the apparatus of

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Baily, since Cattelain teaches that there is no impingement by hot dirty gases on any surfaces in the wet/dry transition zone to cause accretion (column 3, lines 16-18).

Allowable Subject Matter

Claim 33 is allowed.

Claim 32 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: neither Baily nor Stift in view of Stockinger et al or Gordon et al disclose or suggest one or more columns provided within said first furnace chamber, each column comprising a plurality of vertically orientated, vertically spaced tubes, wherein the cross-sectional area of each tube is smaller than that of an adjacent, lower tube, and wherein the ends of adjacent tubes are arranged so as to provide an annular space there between as in Claims 32 and 33.

Response to Arguments

Applicant's arguments with respect to Claims 1-4, 6-8 and 10-16 have been considered but are moot in view of the new ground(s) of rejection. Regarding Claims 17-20 and 22-32, applicant's arguments have been considered but are not persuasive. Applicant argues that both Stift and Baily fail to disclose zinc and lead. While features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function. A claim containing a "recitation with respect

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to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus” if the prior art apparatus teaches all the structural limitations of the claim. See MPEP § 2114.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. EP 174641 teaches pelletizing dust, preheating the pellets, charging the pellets with a reductant to an induction furnace. However, the iron and lead oxides are melted and reduced (page 3, lines 4-16). WO 91/09977 teaches feeding a mass of dust containing oxides of Zn and Fe to a plasma furnace and melting the mixture (page 2). EP 745692 A1 teaches mixing dusts containing zinc and/or lead with reducing agents into a heat treatment furnace (abstract). Zn and Pb are both evaporated (page 4, lines 25-27). EP 108166 A2 teaches recovering iron from waste materials (page 2, lines 13-15). Zn, Pb, and Cd are removed and recovered (page 5, lines 1-3).

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a).

Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

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however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to TIMA M. MCGUTHRY-BANKS whose telephone number is (571)272-2744. The examiner can normally be reached on M-F 8:00 am - 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/T. M. M./
Examiner, Art Unit 1793
10 February 2009

/Roy King/
Supervisory Patent Examiner, Art Unit 1793

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